

# A Review of Epidemiology of Fall among Elderly in India

Alex Joseph, Dhasarathi Kumar, M. Bagavandas

School of Public Health, SRM IST, Kancheepuram, Tamil Nadu, India

## Abstract

**Background:** Injuries have become a major public health concern. Recent data show that globally over 5 million people lose their life due to injury every year. Especially in low- and middle-income countries, people living below the poverty line are drastically scathed due to injuries. **Objective:** The objective of this paper is to find the magnitude and risk factors of fall among the elderly in India. **Materials and Methods:** A systematic search was done by using Google Scholar and PubMed. **Results:** The selected studies revealed that the prevalence of fall ranges from 26% to 37% across various regions, fall injuries are associated with poor vision, vertigo, imbalance, fear of falling, history of fall, presence of osteoarthritis, visual impairment, hearing impairment, and depression. This study has shown the risk of fall was higher among female elderly population. **Conclusion:** The major contributing factors for fall injuries are aging, visual impairment, previous history of fall, depression, and gait problem. Females have a higher risk of fall comparatively to males.

**Keywords:** Falls among elderly, injury in India, risk factors, unintentional injuries

## INTRODUCTION

Injuries are emerging public health problem. Injuries are broadly divided into two groups, intentional injuries and unintentional injuries. Intentional injuries include suicide, collective violence like war, interpersonal violence such as sexual assault, abandonment, homicide, neglect, and other maltreatment. Unintentional injuries include poisoning, road traffic injuries, falls, burn, bite, and drowning. Unintentional injuries have been ranked as the seventh leading cause of death among the elderly population. According to the WHO, estimate falls are the second leading cause of mortality worldwide, and it is estimated that 80% of the falls occurring in low- and middle-income countries, of which South East Asia account for 60% of fall-related mortalities. In the year 2004, around 95,000 death-related falls have occurred in India. Report generated by the WHO has estimated 17 million disability-adjusted life years lost globally due to fall. Falls account for 40% of all injury deaths. According to the WHO among elderly, nearly 37.3 million falls require medical attention every year, and 646,000 individuals die from falls each year.<sup>[1-3]</sup> Fall rate increases when age increases, resulting in morbidity, mortality, and loss of independence.<sup>[4]</sup>

## Rationale

Injuries are the major reason for high out of pocket expenditure as well as often end up with serious health issues. Nowadays,

unintentional injuries are gaining attention, especially among the senior citizens because elderly people are more vulnerable than other age group people.<sup>[5]</sup> Fall is a leading cause for the increase in the morbidity and mortality rates. Due to the fear of fall, elderly tend to compromise social interaction, quality of life by limiting mobility, and also there is a diminished sense of well-being. Fall among elderly has caused serious damage which has led to poor health and poor quality of life among elderly. Identifying the factors associated with fall helps to reduce the incidence of fall and also helps in improving the overall quality of life among the geriatric population. In 2004, the WHO estimated about 0.8 million deaths in India were due to unintentional injuries.<sup>[1,6]</sup> The objective of this paper is to find the magnitude and risk factors of fall among elderly in India.

## Fall

A fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level.<sup>[1]</sup>

**Address for correspondence:** Dr. Alex Joseph,  
School of Public Health, SRM IST, 3<sup>rd</sup> Floor, Medical Building,  
Kancheepuram - 603 203, Tamil Nadu, India.  
E-mail: alexjosephdr@gmail.com

## Access this article online

### Quick Response Code:



**Website:**  
www.ijcm.org.in

**DOI:**  
10.4103/ijcm.IJCM\_201\_18

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** Joseph A, Kumar D, Bagavandas M. A review of epidemiology of fall among elderly in India. Indian J Community Med 2019;44:166-8.

**Received:** 29-06-18, **Accepted:** 15-03-19

## Causes of falls

According to the Internal Classification of Disease 10, the unspecified fall is coded into W19 Unspecified fall, W19. XXXA unspecified fall, initial encounter, W19. XXXD unspecified fall, subsequent encounter, W19. XXXS unspecified fall, sequel. Falls due to tripping and slipping will result in injury or loss, and the external causes of morbidity include stumbling, fall, tripping, and slipping.<sup>[7]</sup>

## MATERIALS AND METHODS

A literature review was undertaken of original research articles on risk factors of fall among elderly >60 years in India. The article search was done in PubMed and Google Scholar. The search strategies were used effectively to obtain studies available in the database. Medical Subject Headings (MeSH) terms were customized for an effective search strategy. The extensive search process decisively narrowed down to selecting five studies. The given MeSH terms were used to gather literature [Figure 1].

The inclusion criteria for selection was studies should be on unintentional fall-related injury, research article should focus on risk factors of fall and study population: elderly (aged more than 60). Studies which were not fulfilling the inclusion criteria were excluded. The articles extracted were full-text papers and reference period of the study (past 10 years).

History			Download
Search	Add to builder	Query	
#5	Add	Search ((#2) AND Fall) NOT Childhood injuries Sort by: Best Match	
#2	Add	Search (#1) AND Elderly (INDIA) Sort by: Best Match	
#1	Add	Search (injuries AND unintentional injuries (INDIA))	

**Figure 1:** “Medical Subject Headings” terms that were used to generate search of articles

Quality of the research article was assessed based on the study design, inclusion, exclusion criteria, sample size, operational definitions, and sampling strategies.

## RESULTS

The community-based cross-sectional study conducted by Sirohi *et al.*, among 456 elderly in a rural area of Haryana, prevalence was 36.6% (32.1–40.0 at 95% confidence interval [CI]) and found that fall is associated with lower socioeconomic status ( $P = 0.03$ , odds ratio [OR] = 1.9), urgency of micturition ( $P = 0.006$ , OR = 2), presence of osteoarthritis ( $P = 0.005$ , OR = 2), visual impairment ( $P = 0.049$ , OR = 1.6), hearing impairment ( $P = 0.04$ , OR = 1.7), depression ( $P = 0.03$ , OR = 2.2), and functional disability ( $P = 0.003$ , OR = 2.1).<sup>[8]</sup> Community-based cross-sectional study conducted by Chacko *et al.* among 655 rural elders, reveals the prevalence of fall is 26% (22.59–29.32 at 95% CI). Most of the falls occurred during morning hours (39.1%). Elderly aged above or equal to 80 years (OR = 3.28) and dizziness (OR = 3.27) were found to be significantly associated with fall.<sup>[9]</sup> The institutional study done in urban area by Dhargave and Sendhilkumar revealed that the prevalence of fall was 28.9% and the occurrence of fall was higher among women than men. There is a significant association between poor vision (OR = 1.851), chronic conditions (OR = 1.633), vertigo (OR = 2.237), imbalance (OR = 3.105), fear of falling (OR = 3.227), and previous falls (OR = 5.661) all risk factors  $P < 0.005$  ( $P < 0.001$ ) for falls.<sup>[10]</sup> Community-based cross-sectional study by Patil *et al.* among 416 elderly in the urban area revealed that the prevalence of fall was estimated to be 29.8% (21.1–38.4 at 95% CI) and the study stated that, there was a significant association between fall and the use of

**Table 1: Basic assessment of studies selected for short communication**

Title	Author	Study design	Study setting	Locations	Tools used for injury survey	Duration of study
Prevalence of risk factors for falls among elderly people living in long-term care homes	Pradnya Dhargave <i>et al.</i> , 2016	Cross-sectional study	Institutional (geriatric homes) Based study	Nagpur, Maharashtra State, and Bengaluru, Karnataka State, India	Berg Balance Scale, Long-Term Care Fall Risk Assessment Form, Fall Factors Assessment Form, MMSE, and Dynamic Gait Index were used as the assessment tools	Not specified
A study of falls among elderly persons in a rural area of Haryana	Aniket Sirohi <i>et al.</i> , 2017	Cross-sectional study	Community-Based study	India	Structured questionnaires	Not specified
Epidemiology of fall and its risk factors among elders in a rural area of Coimbatore, India	Thomas V <i>et al.</i> , 2017	Cross-sectional study	Community Based Cross-sectional study	Coimbatore, India	Semi-structured Questionnaire	Not specified
Risk factors for falls among elderly: A community based study	Patil <i>et al.</i> , 2015	Community-Based cross-sectional study	Community-Based study	Karnataka	A MMSE, the questionnaire used to gather information	April 2009 and March 2010
Epidemiology of falls among older adults: A cross-sectional study from Chandigarh, India	Nalini <i>et al.</i> , 2015	A cross-sectional cluster	Community-Based study	Chandigarh, India	A semi-structured interview schedule	Not specified

MMSE: Mini-mental state examination

antidepressants.<sup>[11]</sup> The prevalence of fall was reported to be 31% in a study conducted by Tripathy *et al.* among elderly sampled from urban, rural and slums areas of Chandigarh. On an average, 0.67 fall episodes were reported per person per year, and urban (0.56) residents had significantly lower fall rate compared to those living in slums (1.08) or villages (1.03); and moreover, the study found the risk of fall was higher among females (OR 1.6), those taking four or more medicines (OR 2.1), and having poor body balance (OR 1.9).<sup>[12]</sup>

## DISCUSSION AND CONCLUSION

The aim of the short communication was to identify the magnitude and risk factors associated with fall among the elderly Indians. The common risk factors associated with fall was found to be aging (more than 80), gender (female), visual impairment, previous history of fall, depression and gait problems. The review found the study conducted by Sirohi *et al.*, among 456 elderly, shows the prevalence of falls among elderly in a rural area of Haryana was 36.6% (32.1–40 at 95% CI),<sup>[8]</sup> were else a community prevalence study conducted by Yeong *et al.* in Malaysia showed the prevalence of fall among the elderly was 4.07%, this study found out that elderly who lived alone had more than two-fold increase in the risk for falls (OR = 2.60,  $P = 0.042$ ).<sup>[13]</sup> The review of a cross-sectional study done at rural coimbatore among 655 elderly found the prevalence of fall to be 26% (22.59–29.32 at 95% CI),<sup>[9]</sup> similar finding was reported by a study among elderly in the United States by Padubidri *et al.* reported the prevalence of fall to be 15.8% and found to be associated with aging, female was at a high risk of fall and depression was found to be one of the major reasons for fall.<sup>[14]</sup> A study among elderly in Saudi Arabia conducted by Alshammari *et al.* result shows similar findings of the review, that age of the participant, gender (female has more risk), impaired health conditions, and environment are associated with falls.<sup>[15]</sup> There is a scarcity of available literature on information such as falls burden, cost, and use of assistive devices, and hence, more research is required to unearth the hidden burden of fall injuries in elderly.

## Limitation

Table 1 shows that the studies have been reported among elderly from various parts of India; most of these studies were limited to the specific region or geographic locations with varied sample size, there are inconsistencies, imprecisions. Therefore, we cannot generalize these studies at the national level.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Falls. World Health Organization; 16 January, 2018. p. 1-2. Available from: <http://www.who.int/news-room/fact-sheets/detail/falls>. [Last accessed on 2018 Jun 22].
2. Burns E, Kakara R. Deaths from falls among persons aged ≥ 65 years – United States, 2007–2016. *MMWR Morb Mortal Wkly Rep* 2018;67:509–14.
3. Masud T, Morris RO. Epidemiology of falls. *Age Ageing* 2001;30 Suppl 4:3–7.
4. Lee WK, Lim D, Park H. Disability-adjusted life years (DALYs) for injuries using death certificates and hospital discharge survey by the Korean burden of disease study 2012. *J Korean Med Sci* 2016;31 Suppl 2:S200–7.
5. Rubenstein LZ. Falls in older people: Epidemiology, risk factors and strategies for prevention. *Age Ageing* 2006;35 Suppl 2:ii37–41.
6. Mane AB, Sanjana T, Patil PR, Srinivas T. Prevalence and correlates of fear of falling among elderly population in urban area of Karnataka, India. *J Midlife Health* 2014;5:150–5.
7. ICD10data 2018. Unspecified Fall. Available from: <https://www.icd10data.com/ICD10CM/Codes/V00-Y99/W00-W19/W19>. [Last accessed on 2018 Jun 22].
8. Sirohi A, Kaur R, Goswami AK, Mani K, Nongkynrih B, Gupta SK. A study of falls among elderly persons in a rural area of Haryana. *Indian J Public Health* 2017;61:99–104.
9. Chacko TV, Thangaraj P, Muhammad GM. Epidemiology of fall and its risk factors among elders in a rural area of Coimbatore, India. *Int J Community Med Public Health* 2017;4:3864–9.
10. Dhargave P, Sendhilkumar R. Prevalence of risk factors for falls among elderly people living in long-term care homes. *J Clin Gerontol Geriatr* 2016;7:99–103.
11. Patil SS, Suryanarayana SP, Dinesh R, Shivraj NS, Murthy NS. Risk factors for falls among elderly: A community-based study. *Int J Health Allied Sci* 2015;4:135.
12. Tripathy NK, Jagnoor J, Patro BK, Dhillon MS, Kumar R. Epidemiology of falls among older adults: A cross sectional study from Chandigarh, India. *Injury* 2015;46:1801–5.
13. Yeong UY, Tan SY, Yap JF, Choo WY. Prevalence of falls among community-dwelling elderly and its associated factors: A cross-sectional study in Perak, Malaysia. *Malays Fam Physician* 2016;11:7–14.
14. Padubidri A, Al Snih S, Samper-Ternent R, Markides KS, Ottenbacher KJ, Raji MA. Falls and cognitive decline in Mexican Americans 75 years and older. *Clin Interv Aging* 2014;9:719–26.
15. Alshammari SA, Alhassan AM, Aldawsari MA, Bazuhair FO, Alotaibi FK, Aldakhil AA, *et al.* Falls among elderly and its relation with their health problems and surrounding environmental factors in Riyadh. *J Family Community Med* 2018;25:29–34.